

Clinical, Bacteriological and Radiological Study of Community Acquired Pneumonia (CAP)**Falguni Makwana¹, Divyang Makwana², Dhruvil Kaila³, Subhagini Srivastava⁴, Kamlesh Desai⁵, Janki Pandya⁶**¹Senior Resident, Smt. N.H.L. Municipal Medical College, SCL Hospital²Assistant Professor, Smt. N.H.L. Municipal Medical College, SCL Hospital³Junior Resident, Smt. N.H.L. Municipal Medical College, SCL Hospital⁴Junior Resident, Smt. N.H.L. Municipal Medical College, SCL Hospital⁵Junior Resident, Smt. N.H.L. Municipal Medical College, SCL Hospital⁶Junior Resident, Smt. N.H.L. Municipal Medical College, SCL Hospital

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Abstract:

Pneumonia that develops outside the hospital is considered community acquired Pneumonia (CAP) and is the highest cause of mortality among infectious diseases. The objective of the study is to know Clinical presentation, the prevalence of causative microorganism and to study the Radiological profile of the patients with community acquired pneumonia. This was a prospective study of 100 patients admitted in tertiary care hospital during the period from August 2019 to August 2021. Patients with age more than 12 years and having clinical features like fever (temperature more than 37.8 degree Celsius), cough (less than 4 weeks), production of purulent sputum, chest pain and difficulty in breathing and having Radiological evidence of pneumonia were included in the study. The patients in this study were of more than 12 years. In this study, older age group (>50 year) is more prone to Pneumonia. The incidence of CAP was most common in males (64%) compared to females(36%). Cough, Fever, Expectoration, Pleuritic chest pain and Dyspnea are common signs present in Community acquired Pneumonia whereas Altered sensorium and Hemoptysis are observed in only few patients. Smoking and COPD are more common associated risk factors. Mortality is less in Community Acquired Pneumonia. Outcome in Community Acquired Pneumonia is good when it is presented and treated timely and accordingly. Most of the patients recovered without any complication except in patients with COPD, symptoms were not completely reduced and were advised for follow-up.

Keywords: Community Acquired Pneumonia, Prospective, Clinical, Radiological, Smoking, Fever, Tertiary.

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Introduction

Pneumonia is defined as inflammation and consolidation of lung tissue due to infectious agent. Pneumonia that develops outside the hospital is considered community acquired Pneumonia (CAP) and is the highest cause of mortality among infectious diseases[1]. It affects all age groups. Pneumonia is one of the leading causes of death and morbidity, both in developing and developed countries and is the commonest cause (10%) of hospitalization [2,3]. In combination with influenza, it is the most frequent cause of infection related death and the eighth leading cause of death overall in united states. Pneumonia is the major cause of death in children under five years and extremes of age. Streptococcus pneumoniae remains the most common cause of CAP. Other bacteria include Haemophilus influenzae, Staphylococcus aureus, Moraxella catarrhalis, Pseudomonas aeruginosa, and other gram-negative bacilli. The order of

their importance depends on the location and population studied. The causative agent remains unidentified in 30.0% to 50.0% of cases[4].

Due to over usage and misuse of oral and intravenous antibiotics, patients are infected with multidrug resistant pathogens. This can lead to healthcare associated pneumonia. Before diagnosing Pneumonia we should rule out some conditions such as pulmonary edema, pulmonary infarction and acute respiratory distress syndrome [5]. Due to lack of knowledge, lack of facilities, pneumonia most often misdiagnosed, underestimated and mistreated. One other reason for poor outcome of patients is, failure to assess the severity of the disease and to treat patient as outpatient or in hospital setup or in intensive care unit. Pneumonia is more common in immune compromised condition like Diabetes, HIV and patient

with chronic lung disease.

Materials and Methods

A prospective clinical study was conducted in tertiary care hospital during the period from August 2019 to August 2021 which included total 100 patients.

Sampling Criteria

Inclusion Criteria

Patients with age more than 12 years

Patients having clinical features like fever (temperature more than 37.8 degree Celsius), cough (less than 4 weeks), production of purulent sputum, chest pain and difficulty in breathing.

Radiological evidence of pneumonia

Exclusion Criteria

Patients having covid-19 positive pneumonia.

HIV positive patients

Tuberculosis

Immuno compromised.

Aspiration pneumonia

Heart failure

The patients who presented with acute onset of fever associated with chills, cough with expectoration, pleuritic chest pain and dyspnea were selected for detailed clinical examination to make a provisional diagnosis of Community Acquired Pneumonia after taking consent. Sputum for Gram Stain and Culture, Sputum AFB are done. Blood for WBC count and Differential Count are done. Chest X-RAY and CT Chest to know the site of infection. Rapid diagnostic tests are done to rule out HIV infection.

Results

The study group consisted of 100 patients. In this study, total 21 patients (21%) were in age group of less than 40 years, total 16 patients (16%) were in age between 41-50 years, total 33 patients (33%) were in age group between 51-60 years and total 30 patients (30%) were in age group of more than 60 years of age. The maximum number of patients affected are in between 51-60 years of age. In this study 64 patients (64%) were male, 36 patients (36%) were female. More prevalence in male than in female.

Patients presented with multiple symptoms but cough is the most common symptom followed by fever. The distribution of symptoms is as below.

Table 1: Symptoms Distribution in the Study Population

Symptoms	No.	%
Cough	100	100%
Fever	97	97%
Expectoration	96	96%
Pleuritic Chest	86	86%
Dyspnea	85	85%
Hemoptysis	13	13%
Altered sensorium	7	7%

On respiratory examination, 98% patients had found crepitations and 94% patients found bronchial breath sounds. Out of 100 patients, 59% patients had habit of smoking and 46% patients had habit of alcohol. In this study Chronic Obstructive Pulmonary Disease (COPD) is most common co-morbidity probably leading to severe CAP.

Table 2: Co-morbidity Distribution in the Study Population

Co-morbidity	No.	%
Diabetes Mellitus	45	45%
Hypertension	38	38%
COPD	57	57%

In gram staining of the sputum 68% found with gram positive bacilli and 20% had gram Negative bacilli. In sputum culture, most common organisms isolated are of gram positive in which streptococcal is most common.

Table 3: Sputum Culture Distribution in the Study Population

Sputum Culture	No.	%
Gram Positive	62	62.00%
Gram Negative	27	27.00%
Not Clear	5	5.00%
No Growth	6	6.00%

Table 4: Culture Organism Distribution in the Study Population

Culture Organism	No.	%
Streptococcus	51	51%
Staphylococcus	11	11%
Klebsiella	16	16%
Pseudomonas	8	8%
Eshcrechia Coli	3	3%
No Growth	6	6%
Not Clear	5	5%

For further investigation in diagnosis, we took sample for blood culture, in which organism found to be positive in 3%.

The difference between Chest X-ray and CT chest scan in identifying pneumonia is very less. The distribution of consolidation in Chest X-ray and chest scan is as below.

Table 5: Consolidation in Chest X-ray in the Study Population

Consolidation in CXR	NO.	%
Bilateral	24	24%
Right Lower Lobe	32	32%
Right Upper Lobe	8	8%
Left Lower Lobe	24	24%
Left Upper Lobe	8	8%
Normal	4	4%

Only 4% patients had normal X-ray but found consolidation on CT chest scan. No patients found normal radiology features in CT scan.

Table 6: Consolidation in CT Chest in the Study Population

Consolidation in CT Chest	No.	%
Bilateral	26	26%
Right Lower Lobe	32	32%
Right Upper Lobe	8	8%
Left Lower Lobe	26	26%
Left Upper Lobe	8	8%
Normal	0	0%

Mortality is less in Community Acquired Pneumonia, so 7% patients had bad outcome and lead to death, while 93% patients recovered and discharged.

Discussion

100 Patients with Community Acquired Pneumonia has taken for this study.

In this study, 37% patients were in less than 50-year age group while 63% patients are in more than 50-year age group. So older age group is more prone to Pneumonia which is comparable to a study done by Patil et al[6] where 36% patients were in below 50 year age group and 64% patients were in more than 50 year age group.

In this study 64 patients (64%) were male, 36 patients (36%) were female. More prevalence in male than in female. In a Study done by Patil et al[6] 74% patients were male while 26% patients were female.

Cough, fever, Expectoration, pleuritic chest pain and dyspnea are common signs present in Community acquired Pneumonia where altered sensorium and hemoptysis are observed in only few patients.

Table 7: Comparison of symptoms

Symptoms	%	Elisabeth[7]
Cough	100%	63.7%
Fever	97%	73.3%
Expectoration	96%	15.1%
Pleuritic Chest pain	86%	25.3%
Dyspnea	85%	58.9%
Hemoptysis	13%	-
Altered sensorium	7%	18.2%

Crepitations present in almost all patients. Bronchial breath sounds present in almost 94% patients. Habit of smoking was observed in 59% of patients with pneumonia. Whereas 100% patients were smokers in CAP in study done by Eva Polverino et al [8]. Smoking (59%) and COPD (57%) are more common associated risk factors for pneumonia. According to study done by eva polverino and antoni Torreson [8], among 238 patients, COPD was the most frequent respiratory illness associated with bacterial pneumonia followed by asthma and bronchiectasis. From which COPD was present in total 72 patients (30%). Habit of Alcohol is observed in 46% and absent in 54% of the patients, whereas only 3% were alcoholic in study done by Eva Polverino et al[8]. Diabetes

Mellitus is observed in 45% patients whereas 28% were diabetic in study done by Eva Polverino et al [8]. So diabetic patients are more prone to develop Pneumonia. Hypertension present in 38% of patients whereas 10% patients were hypertensive in a study done by Patil et al[6].

In gram staining of sputum, 68% patients found gram positive bacilli and 20% patients found gram negative bacilli. In Sputum Culture, Gram Positive in 62% and Gram negative in 27%, undetermined in 5% and no growth in 6%. Among Gram Positive, Streptococcal pneumonia is observed in 51% of the patients.

Table 8: Comparison of culture organisms

Culture Organism	NO.	%	Elisabeth[7]	Wipa and puntip[9]
<i>Streptococcus</i>	51	51%	59.3%	23.1%
<i>Staphylococcus</i>	11	11%	4.8%	4.6%
<i>Klebsiella</i>	16	16%	0%	19.2%
<i>Pseudomonas</i>	8	8%	0.7%	4.6%
<i>Eshcrechia Coli</i>	3	3%	2.1%	4.6%
No Growth	6	6%	35%	0%
Mixed	5	5%	0%	0%

Younger patients were more likely to be infected with *M. pneumoniae*, while the mean age of those with other types of infections was 50. Healthy adults were infected with *M. pneumoniae* and *S. pneumoniae*[8]. Smokers and COPD patients were affected most commonly by gram negative organisms. In Blood Culture, growth is present in 3% and absent in 97% of the patients. Sputum culture yields 94% and blood culture yields 3%.

In this study Right lower lobe affected most common followed by Left lower lobe and bilateral in chest X ray. In this study right lower lobe involvements were common finding followed by bilateral and then Left lower lobe involvement in CT chest but results were better with CT scan in view of chest x-ray. Duration of stay of patients in hospital was maximum upto 2 weeks. Out of 100 patients,93% patients were discharged and 7% patients died which is comparable to a study done by Patil et a[6] in which 92% patients recovered and 8% died.

Conclusion

Males affected more than females. Streptococcal pneumonia is the common pathogen causing community acquired pneumonia followed by *Klebsiella pneumoniae* observed in this study population. *E.coli*, *Pseudomonas* and *staphylococcus* observed in few patients. Gram negative organism common in elderly patient, COPD and in Smokers. Common age group involved are 40 – 60 years. However old age groups mostly affected in pneumonia. Right lung is involved in majority of patients. Patients with comorbid conditions like Diabetes Mellitus and COPD are affected by Pneumonia more commonly.

Smoking, COPD and Alcohol are major risk factors. Sputum culture yields organism. Blood culture yield no organism. In spite of pneumonia, sputum culture is negative in some patients. Significant morbidity and mortality in old age groups. In view of significant mortality and morbidity,as in our study all patients are unvaccinated. It is advisable to give Pneumococcal and influenza vaccination to all patients who are more susceptible and likely to get infected with community acquired Pneumonia like COPD patients, Smokers, Diabetic and immunocompromised patients. These findings indicate that performing proper clinical, microbiological and radiological diagnostics may prevent the unnecessary use of antibiotics and thereby reduce adverse events in those receiving therapy and decrease selective antibiotic pressure on micro-organisms that might otherwise result in the development of antimicrobial resistance among respiratory pathogens. Our findings suggest that routine testing for common respiratory pathogens is warranted for all adults with CAP. This study will used to identify the common organism responsible for community acquired Pneumonia with respect to their different clinical presentation and radiological evidence in form of chest x-ray and high-resolution computed tomography of chest and useful for physicians to start empirical treatment as early as possible and to determine further prognosis according to their clinical, bacteriological and radiological evidence.

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